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THE SALINITY OF NONIRRIGATED SOILS IN THE LOWER RIO GRANDE VALLEY OF TEXAS

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THE SALINITY OF NONIRRIGATED SOILS IN THE LOWER RIO GRANDE VALLEY OF TEXAS [1]

D. L. Carter, C. L. Wiegand and R. R. Allen [2]

INTRODUCTION

Solution of the salinity problems of a particular area begins with the gathering of as much information as possible about the kinds of salts causing the problem, soluble salt sources, soil properties, the portion of the land affected by salts, water table and drainage conditions, and farm management practices. After such information is obtained, the salinity problem can be properly evaluated. Subsequently, reclamation practices can be formulated and initiated, and farmer management practices can be altered to aid reclamation.

Approximately 25 percent of the cultivated, nonirrigated land in the Lower Rio Grande Valley of Texas is highly saline (4, 5).[3] Many of the saline areas support only salt-tolerant weeds. These saline soils are randomly dispersed through nonsaline soils and farmers must plant and cultivate saline areas along with the productive soils. Thus, farmers harvest from areas smaller than those they plant and cultivate. Consequently, operation costs are high and profits are low.

Although there has been considerable evidence that the saline areas are gradually increasing, practically no research was begun to assess the seriousness of the problem until recently. This report presents results from two separate but similar studies of the salinity problem in the nonirrigated farming area in the eastern part of the Lower Rio Grande Valley in the southern tip of Texas. The principal objectives of the studies were (1) to determine the amounts and kinds of salts causing the salinity problem, and (2) to determine differences in chemical, physical, and mineralogical properties between saline and nonsaline soils.

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[2] Research soil scientists and agricultural engineer, respectively, Soil and Water Conservation Research Division, Agricultural Research Service, at Weslaco, Tex.

[3] Underscored numbers in parentheses refer to Literature Cited, p. 8.

METHODS AND MATERIALS [4]

Study A

The first study, study A, was conducted on soil profiles sampled by horizon from ten open pits near San Perlita, Tex., in 1959. The purpose of the study was to characterize soils in an 1,800-acre block of land. On the basis of plant growth, each sampling site was identified as saline, nonsaline, or transitional between saline and nonsaline. The sampling sites were designated as sites 1 through 10, and the soils at each site were classified according to Soil Conservation Service standards (table 1).

All soil samples were analyzed for the following physical and chemical properties:

1. pH of saturation extract.
2. EC_e (electrical conductivity of the saturation extract) (10).
3. Water-soluble ions: Na^+, K^+, Ca^{++}, Mg^{++}, Cl^-, HCO_3^-, $CO_3^=$ and $SO_4^=$ (10).
4. Particle size distribution (8), except for sites 2 and 4.
5. Bulk density, except for surface layers.

Sites 1, 2, 3, and 4 were on a transect 250 feet long for the purpose of studying soil differences across one field. Sites 5 and 6, 7 and 8, and 9 and 10 were paired to study differences between adjacent saline and nonsaline, and saline and transitional soils.

Study B

The second study, study B, was conducted on seven sites, each selected so that soil samples could be taken from a saline soil, a transitional soil, and a nonsaline soil in close proximity. The seven sites were sampled in the spring, 1961, and they were selected at random over a large area so that they would represent 625,000 acres of nonirrigated land in southern Texas. Growth of cotton or grain sorghum was used as the criterion for selecting sampling locations at each site. At each study site, two borings were made in each of the following areas: an area supporting no crop growth, an area where crops were stunted by salinity but surviving, and an area where crop growth was apparently not affected by salinity. The three sampling areas are referred to as the saline, transitional, and nonsaline locations, respectively. The two borings at each location were composited to give soil samples by depth increments of 0 to 3, 3 to 6, 6 to 12, 12 to 18, 18 to 24, 24 to 36, 36 to 48, and 48 to 60 inches. The soil at each sampling location was classified according to Soil Conservation Service standards (table 2).

All samples were analyzed for the following physical, chemical, and mineralogical properties:

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[4] The authors acknowledge the assistance of C. M. Thompson, soil scientist, Soil Conservation Service, U.S. Department of Agriculture, Harlingen, Tex., in classifying the soils of studies A and B.

TABLE 1.--Soil classification for soils at each site in study A

Site No.	Site designation[1]	Soil classification
1	Saline	Raymondville clay loam, saline phase.
2	Transitional	Raymondville clay loam.
3	Nonsaline	Do.
4	Saline	Raymondville clay loam, saline phase.
5	do.	Unnamed fine sandy loam, saline phase.
6	Nonsaline	Willacy sandy clay loam.
7	do.	Do.
8	Saline	Unnamed sandy clay loam, saline phase.
9	do.	Raymondville clay loam, saline phase.
10	Transitional	Raymondville clay loam.

1/ Identified on the basis of plant growth.

TABLE 2.--Soil classification for soils at the sampling locations of each site in study B

Site No.	Sampling location[1]		
	Saline	Transitional	Nonsaline
1	Rio sandy clay loam, saline phase	Rio sandy clay loam	Willacy sandy clay loam.
2	do.	Raymondville sandy clay loam	Raymondville sandy clay loam.
3	do.	Willacy sandy clay loam	Willacy sandy clay loam.
4	do.	do.	Do.
5	Willacy sandy clay loam, saline phase	do.	Do.
6	do.	do.	Do.
7	do.	do.	Do.

1/ Identified on the basis of crop growth.

1. EC_e (10).
2. CEC (cation exchange capacity) (10).
3. ESP (exchangeable sodium percentage) (3,10).
4. Particle size distribution (1).
5. Layer-silicate mineralogy (6, 8).
6. Water-soluble ions: Na^+, K^+, Ca^{++}, Mg^{++}, Cl^-, HCO_3^-, and $CO_3^=$ (10); and $SO_4^=$ (7).
7. Exchangeable cations: Na^+ and K^+ (10); Ca^{++} and Mg^{++} (2, 10).

In addition, total soluble cations and total soluble anions were obtained by summing concentrations of the analyzed water-soluble cations and anions, respectively.

Water samples were collected from each sampling location where the water table was reached. Water samples were taken from one core hole left open for a day after soil sampling. Depth from the soil surface to the water table was recorded before water samples were taken. The water samples were analyzed for EC and the following water-soluble ions: Na^+, K^+, Ca^{++}, Mg^{++}, Cl^-, HCO_3^-, $CO_3^=$, and $SO_4^=$ (7, 10).

Values for the measured physical, chemical, and mineralogical properties of the three sampling locations at each study site were carefully studied to determine differences in soil properties among the different locations at each site. The complete data for all sites were studied to determine overall differences in the properties of saline, transitional, and nonsaline soils.

RESULTS AND DISCUSSION

Study A

The data on salinity, water-soluble ions, and saturation extract pH data for all soils in study A are presented in appendix table 3. Particle size distribution and bulk density are given in appendix table 4.

Soil salinity levels (EC_e) at sites 1 and 4 were extremely high in the surface 2 inches and decreased with depth to an almost constant level between 15 and 20 mmhos/cm. below a depth of 20 inches. In contrast, the salinity levels at sites 2, 3, 7, 8, and 10 were low in the surface 2 inches and increased with depth; high salinity levels occurred at different depths for each of these five soils. Only the profile at site 6 exhibited low salinity levels throughout the depth of sampling (to 66 inches). Site 9 soil had a low salinity level in only the surface 2 inches. Site 5 soil exhibited a moderate salinity level in the surface 2 inches, but was highly saline below that depth.

Soil horizons having EC_e values greater than 2.0 mmhos/cm. contained predominantly chloride salts of Na, Ca, and Mg. Bicarbonate salts dominated in soils with EC_e levels below 1 mmho/cm. The concentration of Ca^{++} plus Mg^{++} exceeded that of Na^+ in the surface horizon of all soils except sites 5, 9, and 10. The opposite was true for the deepest four horizons sampled of all soils except at site 6. The Na^+ concentration increased with depth in all soils except those of sites 1 and 6. The Ca^{++} plus Mg^{++} concentration also

increased with depth at sites 2, 3, and 10, but where both Na^+ and Ca^{++} plus Mg^{++} concentrations increased with depth, the Na^+ concentration increased faster.

The $SO_4^{=}$ concentration increased with depth in all soils, except at site 6, which contained none. Five soils did not contain $SO_4^{=}$ in the surface 5 inches. Soils at sites 2 and 3 contained $SO_4^{=}$ in only the deepest four horizons sampled. In four profiles, sites 2, 3, 4, and 9, the $SO_4^{=}$ concentration approached that of Cl^- in the deepest two horizons sampled, but only in two of the deepest three horizons of the soil at site 3 did $SO_4^{=}$ exceed that of Cl^-. $CO_3^{=}$ was absent in all soils. The concentration of K^+ when considered as a salinity constituent was low in all samples, but was adequate from a soil fertility standpoint.

Study B

The data obtained for study B are contained in appendix tables 5 to 25. The soils at all the saline locations (table 2) contained high salt concentrations throughout the soil profile (appendix table 5). All of them except the saline soil at site 4 exhibited a reduction in salt concentration with increasing depth to approximately 2 feet, below which the concentration was nearly constant in each profile. The soils at the transitional locations, except at site 1, contained moderately high salt concentrations, and were truly transitional between saline and nonsaline with respect to salt concentration. All the soils at the nonsaline locations exhibited low salt concentrations to the 2-foot depth, but some of them were moderately saline below that depth. Salt concentration increased with depth in these nonsaline soils except at site 4.

Water-soluble Na^+ concentrations were high at the surface and became progressively lower with increasing depth to about 18 inches in the saline soils (appendix table 6). The opposite was true for the transitional and nonsaline soils. Concentrations of Na^+ were nearly as high below 36 inches in transitional soils as they were below the same depth in saline soils. The nonsaline soil at site 2 contained a high water-soluble Na^+ concentration in the 48- to 60-inch depth.

Water-soluble K^+ concentrations were too low to be significant as a salinity constituent (appendix table 7). Concentrations of K^+ decreased with depth in nearly all saline, transitional, and nonsaline soils. Generally, concentrations were higher in the saline soils.

Both water-soluble Ca^{++} and Mg^{++} concentrations were progressively lower with increasing depth in saline soils, and progressively higher with increasing depth in transitional and nonsaline soils (appendix tables 8 and 9). Generally, in saline soils, Ca^{++} plus Mg^{++} concentrations equaled more than 50 percent of the total water-soluble cations in the upper four sampling depths (appendix tables 8, 9, and 10), but below the 18-inch depth, water-soluble Na^+ concentrations were over 50 percent of the total (appendix tables 6 and 10). Water soluble Ca^{++} plus Mg^{++} concentrations accounted for 50 percent or more of the total water-soluble cation concentration to depths of 2 feet and 4 feet in transitional and nonsaline soils, respectively.

The Cl^- concentrations were highest among the anions determined for saline soils (appendix tables 11, 12, 13, and 14). When the EC_e level was below 2.0 mmhos/cm., however, HCO_3^- concentration was generally higher than that of Cl^-. Generally, $SO_4^=$ concentrations increased with increasing depth for all soils. However, $SO_4^=$ concentrations were not high in any soils. Furthermore, when Cl^- concentrations were very low, $SO_4^=$ concentrations were also very low, but when Cl^- concentrations were high, $SO_4^=$ concentrations varied from near 0 to approximately 2.5 meq./100 g. Therefore, Cl^- is the principal anion that accumulates as these soils become saline. Thus the salts present in the nonirrigated saline soils of the Lower Rio Grande Valley are predominantly chloride salts of Na^+, Ca^{++}, and Mg^{++}. In contrast, the nonsaline soils have very low Cl^- concentrations, and the principal salts are bicarbonates of the same cations, in very low concentrations.

The ESP levels were generally greater than 15 percent for saline soils (appendix table 15). Therefore, according to classification standards (10), these are saline-sodic soils. However, because of the effects of salt concentration on the ion adsorption properties of clays, these saline-sodic soils do not become sodic soils when soluble salts are leached (5). The probable reason why leaching did not result in sodic soils is because both exchangeable and water-soluble K^+ plus Ca^{++} plus Mg^{++} concentrations were also relatively high in these saline-sodic soils (appendix tables 16, 17, 18, and 19). Furthermore, ESP values were generally above 15 percent only where soluble salt concentrations were high. In these cases Ca^{++} plus Mg^{++} concentrations were also high.

Total exchangeable cation concentrations followed the same trends as did the CEC (appendix tables 20 and 21). Differences between the two measurements result from differences in techniques and because small and varying amounts of some exchangeable ions not measured were likely present.

Particle size distribution analyses for the study B sites are presented in appendix tables 22, 23, and 24. Clay content increased and sand content decreased with depth in all soils. The silt percentage was practically the same at all depths of each soil. Therefore, an increase in clay content was generally reflected by a corresponding decrease in sand content. The important difference between saline and nonsaline soils was that clay contents reached much higher levels below the surface 12 inches of soil in saline soils (appendix table 24). Transitional soils exhibited clay contents between those for saline and nonsaline soils.

The high clay content below the 12-inch depth in saline soils is conducive to higher capillary rise from the underlying water table than occurs in nonsaline soils. Since the water at the water table is generally saline (appendix table 25), capillary rise enhances the salinization process. A high clay content also causes lower infiltration rates in saline than in nonsaline soils.[5/] The effects of greater upward water and salt movement, slower

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5/ Unpublished data in the authors' files.

infiltration rates, and the slightly higher elevations of saline soils combine to perpetuate the salinity problem of the study area. A knowledge of these processes makes it easy to understand why saline areas increase during prolonged dry periods and why soils considered to be transitional when sampled may become too saline for crop production during a prolonged drouth.

The types of layer-silicate minerals present in these soils are montmorillonites, micas, and kaolinites. Small amounts of vermiculite were found in upper layers of a few of the soils. All the soils contained essentially the same clay-type distribution on the basis of X-ray diffraction analyses. Results from mineralogical analyses agree with previously reported findings on these soils (9).

SUMMARY AND CONCLUSIONS

Results of two separate but similar studies were combined to present basic chemical, physical, and mineralogical properties of soils of the nonirrigated area in the Lower Rio Grande Valley of Texas in locations classified saline, transitional, and nonsaline on the basis of plant growth. These results are summarized and presented for use in planning future reclamation and management programs for that area. The conclusions drawn from the results are summarized as follows:

1. Plant growth is a good criterion of the salinity status of the nonirrigated soils of southern Texas.
2. In saline soils the EC_e decreases sharply with increasing depth to 2 feet, below which the EC_e is nearly constant at about 17.0 mmhos/cm. Generally, the EC_e increases with increasing depth in both nonsaline and transitional soils. All transitional soils are saline below the 2-foot depth. Some of the nonsaline soils are saline below the 3-foot depth.
3. The principal salts in soils with EC_e levels greater than 2.0 mmhos/cm. are chlorides of Na^+, Ca^{++}, and Mg^{++}; bicarbonates of the same cations are the principal salts in soils with lower EC_e levels. Ca^{++} plus Mg^{++} compose over 50 percent of the water-soluble cations at depths shallower than 18 inches in saline soils, but Na^+ predominates below 18 inches from the surface. The quantities of $SO_4^{=}$ and K^+ were also measured, but they appear to be of no importance from the salinity standpoint. $CO_3^{=}$ was absent from all soils.
4. The ESP exceeds 15 percent in all saline soils and in some transitional soils. Therefore, many soils are saline-sodic. However, because Ca^{++} plus Mg^{++} concentrations are high, sodic soils are not expected to develop from reclamation practices.
5. Clay content increases sharply with depth in saline soils, becoming approximately 10 percent higher than in nonsaline soils below the 1-foot depth. Sand content decreases with depth and silt content remains constant with increasing depth. The influence of the high clay content of the saline soils on both the upward and downward flow of water and salt, and the fluctuating saline water table are believed to be major factors in the perpetuation and dynamic pattern of saline soils in the study area.

6. Layer-silicate mineral types do not differ among the soils studied. Montmorillonites, micas, and kaolinites are present in all soils, and vermiculite is present in small amounts in the surface 6 inches of some soils.

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APPENDIX

TABLE 3.--Chemical properties of study A soil profiles

SITE 1, RAYMONDVILLE CLAY LOAM, SALINE PHASE

Soil horizon	Depth from surface	Saturation extract pH	EC_e	Na^+	K^+	Ca^{++}	Mg^{++}	Cl^-	HCO_3^-	$SO_4^=$
	Inches		Mmhos cm.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
Ap1	0-2	6.6	90.0	12.92	0.34	13.20	4.85	26.55	0.06	-
	2-5	6.9	50.0	8.29	.20	8.48	2.26	16.26	.11	-
A12	5-15	7.1	23.0	4.80	.08	3.50	1.62	7.45	.14	-
AC1	15-27	6.9	16.0	5.47	.04	2.21	1.30	6.64	.12	0.94
AC2	27-36	6.7	17.0	5.47	.03	2.13	1.16	5.97	.08	1.62
Cca	36-51	6.8	17.0	6.41	.03	1.73	1.21	5.79	.09	2.02
C1	51-66	6.8	17.5	7.41	.04	1.74	1.67	6.96	.08	2.29
C2	66-80	6.7	20.0	8.51	.05	2.36	1.88	7.04	.08	4.19
Ccs	80-104	6.6	20.0	7.76	.04	2.28	1.91	7.39	.08	4.39

SITE 2, RAYMONDVILLE CLAY LOAM (TRANSITIONAL LOCATION)

Ap1	0-2	7.3	1.62	0.25	0.05	0.39	0.08	0.39	0.21	0.03
	2-5	7.3	1.10	.15	.03	.27	.06	.25	.17	.00
	5-10	7.1	1.10	.19	.02	.26	.07	.29	.18	.00
A12	10-19	7.2	1.32	.23	.01	.36	.09	.40	.18	.00
AC	19-26	6.9	2.00	.58	.01	.34	.10	.75	.14	.00
Cca	26-45	6.9	3.20	1.53	.01	.20	.18	1.21	.14	.46
C1	45-62	6.9	5.30	2.85	.02	.27	.31	2.10	.13	.96
C2	62-83	6.9	7.50	4.45	.03	.45	.48	3.26	.12	1.91
C3	83-107	6.6	11.70	5.03	.03	1.06	.81	3.66	.10	3.44

SITE 3, RAYMONDVILLE CLAY LOAM (NONSALINE LOCATION)

Ap1	0-2	8.4	1.13	0.25	-	0.28	0.07	0.19	0.20	0.00
	2-7	7.8	.72	.13	.02	.18	.05	.10	.12	.00
A12	7-14	7.5	.69	.05	.01	.21	.06	.11	.13	.00
AC	14-30	7.4	.98	.22	.01	.21	.10	.24	.10	.00
Cca1	30-44	7.9	2.20	.89	.01	.15	.13	.50	.11	.43
Cca2	44-65	7.7	5.00	2.42	.02	.30	.26	.81	.09	2.01
Cca3	65-95	7.3	10.50	3.66	.02	1.36	.80	.99	.07	5.03
D	95-108	6.7	14.00	3.81	.01	.97	.97	3.21	.08	3.06

Table 3.--continued.

Soil horizon	Depth from surface	Saturation extract pH	EC_e	Na^+	K^+	Ca^{++}	Mg^{++}	Cl^-	HCO_3^-	$SO_4^=$
	Inches		Mmhos cm.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
SITE 4, RAYMONDVILLE CLAY LOAM, SALINE PHASE										
Ap1	0-2	6.9	56.0	7.09	0.20	10.42	2.22	16.89	0.06	0.29
	2-5	7.2	41.0	5.36	.17	8.68	2.09	13.08	.08	.70
	5-8	7.1	36.0	4.73	.11	6.77	1.56	11.28	.07	.43
A12	8-20	7.4	16.5	4.66	.03	1.91	1.52	6.13	.10	.95
AC1	20-29	7.2	17.0	5.41	.02	1.24	1.08	5.73	.07	1.33
AC2	29-37	7.2	18.0	5.97	.02	1.16	1.27	5.92	.09	1.88
Cca	37-54	7.3	16.0	6.04	.03	.82	1.60	5.25	.08	1.87
C1	54-73	7.6	18.0	7.16	.03	1.81	1.34	5.52	.08	4.82
C2	73-92	7.3	19.0	8.04	.03	1.88	1.38	5.68	.09	5.46
C3	92-120	7.1	17.5	7.24	.02	.87	1.04	5.79	.07	3.43
SITE 5, UNNAMED FINE SANDY LOAM, SALINE PHASE										
Ap1	0-2	7.8	7.5	1.32	0.04	0.38	0.24	1.22	0.07	0.00
	2-5	7.4	28.0	4.23	.07	1.24	.95	4.87	.07	.00
	5-7	7.5	36.0	5.18	.07	2.12	1.36	7.04	.06	.33
B2	7-15	7.5	25.0	6.86	.08	1.58	1.47	7.28	.11	1.23
B3	15-31	7.3	24.0	7.60	.03	1.69	1.66	6.69	.10	3.64
Cca1	31-46	7.3	24.0	6.98	.04	1.68	1.39	5.69	.06	4.21
Cca2	46-61	7.2	22.0	6.62	.03	1.12	1.22	6.08	.06	3.19
Cca3	61-78	6.6	24.0	7.06	.04	1.83	2.03	6.25	.07	3.30
D	78-102	6.6	31.0	7.37	.04	1.89	1.83	7.64	.06	3.19
SITE 6, WILLACY SANDY CLAY LOAM (NONSALINE LOCATION)										
Ap1	0-2	7.9	0.93	0.13	0.06	0.16	0.08	0.08	0.24	0.00
	2-5	7.3	1.43	.12	.04	.25	.16	.07	.12	.00
	5-9	7.4	1.40	.09	.04	.14	.16	.07	.17	.00
A12	9-18	7.2	.56	.06	.01	.13	.07	.16	.09	.00
B21	18-33	7.4	.58	.05	.01	.13	.06	.08	.09	.00
B22	33-48	7.2	.41	.05	.01	.12	.03	.06	.08	.00
Cca	48-66	7.2	.35	.05	.00	.09	.04	.05	.07	.00
SITE 7, WILLACY SANDY CLAY LOAM (NONSALINE LOCATION)										
Ap1	0-2	7.7	0.62	0.05	0.04	0.12	0.07	0.03	0.14	0.00
	2-5	7.4	.53	.03	.03	.10	.08	.02	.16	.00
	5-9	7.9	.54	.06	.02	.11	.07	.03	.17	.11
A12	9-19	7.4	.66	.07	.01	.19	.09	.05	.14	.12
B21	19-28	7.4	.61	.07	.01	.16	.10	.05	.15	.05
B22	28-41	7.2	.56	.13	.01	.11	.07	.06	.14	.07
Cca1	41-54	7.2	.84	.34	.01	.04	.10	.07	.14	.12
Cca2	54-68	7.3	2.08	1.06	.02	.11	.11	.53	.16	.24
Cca3	68-86	7.4	2.28	1.49	.01	.07	.14	.85	.21	.32
D	86-108	7.2	4.85	2.48	.01	.13	.16	2.05	.12	.37

Table 3.--continued

Soil horizon	Depth from surface	Saturation extract pH	EC_e	Na^+	K^+	Ca^{++}	Mg^{++}	Cl^-	$HCO_4^=$	$SO_4^=$
	Inches		Mmhos cm.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
SITE 8, UNNAMED SANDY CLAY LOAM, SALINE PHASE										
Ap1	0-2	7.4	2.20	0.39	0.04	0.34	0.14	0.54	0.16	0.05
	2-5	7.4	2.55	.47	.05	.40	.12	.68	.15	.07
	5-9	7.3	4.05	.88	.05	.57	.29	1.11	.14	.29
A12	9-16	7.3	4.15	1.21	.02	.57	.28	1.43	.14	.33
B21	16-24	7.2	5.75	1.97	.02	.70	.37	1.92	.15	.75
B22	24-34	7.0	8.60	3.29	.02	1.01	.65	3.11	.10	1.59
Cca	34-50	6.9	9.75	4.41	.02	.71	.74	3.45	.09	2.18
C1	50-66	7.0	9.30	4.80	.03	.50	.61	4.06	.10	1.64
C2	66+	7.2	8.88	5.08	.03	.55	.58	4.20	.11	1.88
SITE 9, RAYMONDVILLE CLAY LOAM, SALINE PHASE										
Ap1	0-2	7.5	3.6	0.73	0.05	0.38	0.14	0.60	0.16	0.37
	2-5	7.1	13.0	2.28	.10	1.84	.60	3.21	.09	1.05
	5-10	7.1	25.0	5.12	.15	3.95	1.54	8.51	.08	.98
A12	10-19	7.1	21.3	5.34	.13	3.84	1.65	8.69	.09	1.19
AC1	19-28	7.1	27.5	7.92	.16	5.21	2.63	13.51	.06	1.48
AC2	28-37	6.8	24.8	8.77	.13	2.96	3.01	11.27	.07	2.13
Cca	37-59	7.1	20.0	8.88	.07	1.75	1.88	8.72	.07	3.08
C1	59-79	7.2	16.5	7.86	.03	.79	1.16	7.32	.08	1.86
C2	79-99	7.2	14.5	9.06	.04	1.18	1.39	6.99	.12	3.58
Ccs	99-115	7.2	17.8	12.15	.05	3.02	1.51	8.90	.10	6.78
D1	115-144	7.2	21.5	12.06	.04	2.13	2.09	7.03	.08	5.23
SITE 10, RAYMONDVILLE CLAY LOAM (TRANSITIONAL LOCATION)										
Ap1	0-2	7.9	2.2	0.53	0.05	0.29	0.10	0.56	0.21	0.00
	2-5	7.7	2.7	.76	.04	.36	.16	.77	.16	.00
	5-10	7.6	2.4	.62	.03	.41	.05	.74	.17	.00
A12	10-22	7.4	11.1	3.59	.04	1.56	.83	4.67	.11	.62
AC	22-32	7.2	13.4	4.72	.04	1.66	1.19	5.50	.09	1.30
Cca1	32-43	7.2	13.0	5.22	.03	1.15	1.12	5.48	.08	1.15
Cca2	43-57	7.1	13.4	6.04	.03	.97	1.14	5.98	.09	1.24
C1	57-77	7.1	15.3	7.73	.04	1.96	1.60	6.32	.09	3.97
C2	77-88	7.0	16.5	8.30	.04	1.96	1.59	7.16	.08	3.92
C3	88-108	7.1	17.5	9.12	.04	1.44	1.76	8.47	.08	3.18

TABLE 4.--Physical properties of study A soil profiles

SITE 1, RAYMONDVILLE CLAY LOAM, SALINE PHASE

Horizon	Depth from surface	Bulk density	Particle size distribution		
			Sand	Silt	Clay
	Inches	G./cm.^{3}	Percent	Percent	Percent
Ap1	0-2	-	50.82	22.75	26.43
	2-5	-	47.97	22.52	29.51
A12	5-15	1.52	41.12	23.00	35.88
AC1	15-27	1.53	40.93	22.20	36.88
AC2	27-36	1.66	38.76	22.44	38.82
Cca	36-51	1.71	37.11	23.02	39.88
C1	51-66	1.67	31.52	25.34	43.14
C2	66-80	1.56	22.05	30.06	47.90
Ccs	80-104	1.53	16.11	33.50	50.39

SITE 2, RAYMONDVILLE CLAY LOAM (TRANSITIONAL LOCATION)[1]

Ap1	0-2	-			
	2-5	-			
	5-10	-			
A12	10-19	1.47			
AC	19-26	1.66			
Cca	26-45	1.67			
C1	45-62	1.62			
C2	62-83	1.54			
C3	83-107	1.61			

SITE 3, RAYMONDVILLE CLAY LOAM (NONSALINE LOCATION)

Ap1	0-2	-	44.52	22.90	32.59
	2-7	-	46.36	20.08	33.57
A12	7-14	1.61	49.38	20.43	30.20
AC	14-30	1.52	46.08	23.47	30.45
Cca1	30-44	1.75	42.89	23.58	33.53
Cca2	44-65	1.69	38.78	22.71	38.51
Cca3	65-95	1.62	32.05	25.64	42.32
D	95-108	-	75.17	13.21	11.63

[1] Particle size distribution not determined.

Table 4.--continued

Horizon	Depth from surface	Bulk density	Particle size distribution		
			Sand	Silt	Clay
	Inches	G./cm.^{3}	Percent	Percent	Percent
SITE 4, RAYMONDVILLE CLAY LOAM, SALINE PHASE[1]					
Ap1	0-2	-			
	2-5	-			
	5-8	-			
A12	8-20	1.56			
AC1	20-29	1.59			
AC2	29-37	1.64			
Cca	37-54	1.65			
C1	54-73	1.64			
C2	73-92	1.52			
C3	92-120	1.50			
SITE 5, UNNAMED FINE SANDY LOAM, SALINE PHASE					
Ap1	0-2	-	78.40	14.33	7.28
	2-5	-	78.52	13.37	8.12
	5-7	-	76.93	12.28	10.80
B2	7-15	1.56	53.84	11.04	35.13
B3	15-31	1.59	48.60	12.63	38.78
Cca1	31-46	1.67	53.43	16.35	30.23
Cca2	46-61	1.67	50.34	17.02	32.65
Cca3	61-78	1.69	48.13	16.79	35.09
D	78-102	-	61.58	17.44	20.99
SITE 6, WILLACY SANDY CLAY LOAM (NONSALINE LOCATION)					
Ap1	0-2	-	56.49	19.25	24.26
	2-5	-	56.60	18.82	24.58
	5-9	-	57.56	18.12	24.33
A12	9-18	1.61	64.09	13.62	22.29
B21	18-33	1.62	62.99	13.08	23.93
B22	33-48	1.63	64.39	14.39	21.23
Cca	48-64	1.61	62.48	14.69	22.83
SITE 7, WILLACY SANDY CLAY LOAM (NONSALINE LOCATION)					
Ap1	0-2	-	59.06	14.84	26.11
	2-5	-	59.26	10.20	30.54
	5-9	-	59.17	9.67	31.17
A12	9-19	1.61	56.00	9.23	34.77
B21	19-28	1.65	53.91	9.50	36.59
B22	28-41	1.62	47.90	18.18	33.93
Cca1	41-54	1.63	43.51	21.62	34.86
Cca2	54-68	1.67	40.51	24.47	35.03
Cca3	68-86	1.67	23.87	30.45	45.69
D	86-108	-	40.31	30.11	29.58

[1] Particle size distribution not determined.

Table 4.--continued

Horizon	Depth from surface	Bulk density	Particle size distribution		
			Sand	Silt	Clay
	Inches	G./cm.^{3}	Percent	Percent	Percent
SITE 8, UNNAMED SANDY CLAY LOAM, SALINE PHASE					
Ap1	0-2	-	55.24	15.41	29.35
	2-5	-	54.07	15.45	30.49
	5-9	-	53.28	14.67	32.06
A12	9-16	1.53	46.56	15.77	37.68
B21	16-24	1.54	43.17	19.22	37.62
B22	24-34	1.62	35.98	22.77	41.26
Cca	34-50	1.69	33.36	25.17	41.48
C1	50-66	1.63	32.08	24.90	43.03
C2	66+	1.63	25.99	28.42	45.60
SITE 9, RAYMONDVILLE CLAY LOAM, SALINE PHASE					
Ap1	0-2	-	62.21	14.99	22.81
	2-5	-	60.76	14.46	24.79
	5-10	-	55.65	14.78	29.58
A12	10-19	1.54	48.37	15.87	35.77
AC1	19-28	1.53	43.27	18.82	39.91
AC2	28.37	1.65	33.81	23.57	42.63
Cca	37-59	1.80	30.24	27.07	42.69
C1	59-79	1.78	25.51	29.91	44.49
C2	79-99	1.76	6.36	44.75	48.90
Ccs	99-115	-	3.36	37.65	59.00
D1	115-144	-	13.10	42.75	44.16
SITE 10, RAYMONDVILLE CLAY LOAM (TRANSITIONAL LOCATION)					
Ap1	0-2	-	49.24	17.38	33.38
	2-5	-	47.81	18.54	33.66
	5-10	-	47.17	18.97	33.87
A12	10-22	1.47	40.84	21.98	37.19
AC	22-32	1.60	35.00	24.98	40.01
Cca1	32-43	1.78	30.97	27.39	41.65
Cca2	43-57	1.81	29.44	27.73	42.84
C1	57-77	1.83	24.52	27.80	47.69
C2	77-88	-	22.33	32.28	44.39
C3	88-108	-	17.80	37.13	45.08

TABLE 5.--Electrical conductivity of the saturation extract (EC_e) for study B soils

SALINE LOCATION

Depth (inches)	EC_e for soil at -- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Mmhos cm.	Mmhos cm.	Mmhos cm.	Mmhos cm.	Mmhos cm.	Mmhos cm.	Mmhos cm.	Mmhos cm.
0-3	110.0	80.0	88.0	18.0	47.4	44.5	35.2	60.4
3-6	46.5	44.0	70.8	15.0	38.5	41.2	31.8	41.1
6-12	35.6	25.5	38.0	19.0	24.3	28.5	28.0	28.4
12-18	23.0	20.0	31.0	19.4	20.0	16.5	15.5	20.8
18-24	24.0	19.0	27.8	18.6	20.0	12.0	12.2	19.1
24-36	18.5	14.6	28.0	18.0	18.3	10.6	14.5	17.5
36-48	19.2	12.2	24.2	17.0	19.5	13.0	13.0	16.9
48-60	14.5	10.8	26.8	15.6	20.5	12.0	14.5	16.4
TRANSITIONAL LOCATION								
0-3	20.5	2.24	2.85	1.48	8.6	4.4	8.6	6.95
3-6	15.0	.94	3.20	4.00	13.6	10.8	10.4	8.28
6-12	16.2	.83	2.10	5.50	16.0	13.3	11.6	9.36
12-18	14.0	1.23	1.67	8.90	15.0	14.0	9.8	9.22
18-24	14.7	2.96	5.90	12.00	15.1	16.0	12.5	11.30
24-36	14.0	9.89	14.90	10.20	14.6	15.0	9.9	12.60
36-48	10.1	11.83	15.00	9.10	13.9	16.1	14.1	12.90
48-60	7.0	11.32	18.50	8.90	16.5	15.7	15.5	13.30
NONSALINE LOCATION								
0-3	0.93	1.97	1.53	1.26	1.38	0.81	0.68	1.22
3-6	.65	.53	2.15	1.12	1.02	.82	.79	1.01
6-12	.60	.58	1.18	1.10	.96	.65	.70	.82
12-18	.66	.55	.92	.68	.79	.66	.83	.73
18-24	.57	1.02	.78	.73	.54	.76	.91	.76
24-36	.54	3.77	.86	.77	2.75	.86	1.50	1.58
36-48	.66	6.73	.83	.83	6.30	3.37	4.60	3.33
48-60	.97	9.30	7.60	.80	9.60	8.30	4.95	5.93

TABLE 6.--Water-soluble Na^+ for study B soils

SALINE LOCATION

Depth (inches)	Water-soluble Na^+ for soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	29.23	17.48	23.45	3.20	6.73	3.78	5.54	12.77
3-6	8.78	9.50	16.18	2.65	5.88	3.82	5.34	7.45
6-12	4.92	5.78	9.28	3.70	4.24	3.05	4.80	5.11
12-18	6.73	5.32	6.78	4.85	4.46	2.45	3.43	4.86
18-24	8.21	6.23	7.38	5.65	3.96	2.47	3.13	5.29
24-36	7.40	4.83	7.85	6.50	5.57	3.25	3.86	5.61
36-48	7.74	5.04	7.05	7.00	6.30	4.05	3.58	5.82
48-60	6.79	4.42	7.66	7.50	8.04	3.93	4.71	6.15
TRANSITIONAL LOCATION								
0-3	4.04	0.24	0.30	0.30	0.50	0.30	0.89	0.94
3-6	3.62	.17	.34	.82	.75	.62	1.10	1.06
6-12	3.69	.22	.30	1.65	1.00	1.10	1.25	1.32
12-18	5.01	.50	.44	3.50	1.40	1.45	1.71	2.00
18-24	5.47	1.25	1.98	5.85	1.87	2.17	2.74	3.05
24-36	5.67	3.67	3.90	6.30	2.53	3.09	2.57	3.96
36-48	4.97	3.85	4.15	5.85	3.58	3.56	3.40	4.19
48-60	3.26	3.28	5.40	5.02	5.03	4.06	4.57	4.37
NONSALINE LOCATION								
0-3	0.05	0.14	0.15	0.13	0.07	0.05	0.09	0.10
3-6	.04	.07	.12	.08	.07	.05	.10	.08
6-12	.05	.09	.08	.08	.06	.05	.08	.07
12-18	.08	1.70	.07	.74	.05	.04	.11	.40
18-24	.09	3.38	.06	.97	.04	.05	.15	.68
24-36	.09	1.28	.12	.17	.16	.06	.30	.31
36-48	.19	2.95	.28	.80	.80	.45	1.04	.86
48-60	.24	4.70	2.79	.25	2.06	1.88	.39	1.90

TABLE 7.--Water-soluble K^+ for study B soils

SALINE LOCATION

Depth (inches)	Water-soluble K^+ for soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	0.06	0.21	0.35	0.10	0.18	0.20	0.09	0.17
3-6	.11	.32	.24	.09	.15	.18	.08	.17
6-12	.08	.08	.12	.06	.08	.12	.06	.09
12-18	.05	.07	.11	.03	.06	.06	.03	.06
18-24	.05	.05	.06	.02	.04	.03	.02	.04
24-36	.05	.03	.04	.00	.05	.03	.02	.03
36-48	.04	.03	.04	.03	.04	.03	.02	.03
48-60	.04	.04	.05	.03	.05	.02	.02	.04

TRANSITIONAL LOCATION

0-3	0.19	0.05	0.10	-	0.12	0.07	0.07	0.10
3-6	.12	.02	.11	.05	.16	.09	.07	.09
6-12	.09	.01	.05	.03	.12	.07	.05	.06
12-18	.06	.01	.03	.03	.07	.04	.04	.04
18-24	.06	.01	.03	.03	.05	.04	.04	.04
24-36	.06	.02	.05	.03	.04	.03	.03	.04
36-48	.04	.03	.04	.03	.04	.03	.03	.03
48-60	.03	.02	.05	.03	.04	.02	.03	.03

NONSALINE LOCATION

0-3	0.06	0.06	0.09	0.05	0.10	0.04	0.02	0.06
3-6	.05	.02	.02	.05	.07	.04	.03	.04
6-12	.04	.02	.07	.02	.06	.03	.03	.04
12-18	.03	.01	.04	.02	.05	.02	.04	.03
18-24	.02	.01	.01	.01	.02	.02	.05	.02
24-36	.01	.01	.01	.01	.06	.01	.02	.02
36-48	.01	.02	.01	.01	.07	.02	.02	.02
48-60	.00	.04	.02	.00	.06	.03	.01	.02

TABLE 8.--Water-soluble Ca^{++} for study B soils

SALINE LOCATION

Depth (inches)	Water-soluble Ca^{++} for soil at--							Average of all sites
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	12.83	12.53	17.35	2.45	8.29	9.12	5.23	9.68
3-6	3.93	7.42	10.65	2.19	5.56	8.19	5.06	6.14
6-12	3.53	3.20	5.75	2.84	2.08	5.85	5.01	4.04
12-18	2.31	2.98	3.22	2.80	2.03	3.15	2.35	2.69
18-24	2.75	2.64	2.60	2.55	1.46	2.04	1.45	2.21
24-36	2.08	1.46	3.04	1.83	1.38	1.50	1.61	1.84
36-48	1.98	1.15	2.36	1.13	1.23	1.46	1.29	1.51
48-60	1.14	1.11	2.34	.99	1.64	.88	1.02	1.30
TRANSITIONAL LOCATION								
0-3	2.43	0.42	0.45	0.15	2.02	0.70	1.30	1.07
3-6	1.58	.15	.55	.38	3.81	1.88	1.74	1.44
6-12	1.56	.10	.33	.52	4.31	2.96	1.99	1.69
12-18	1.33	.13	.23	.87	4.21	3.49	2.08	1.76
18-24	1.32	.28	.83	1.20	3.95	3.74	2.25	1.94
24-36	1.14	1.31	2.32	1.01	3.13	3.24	1.33	1.96
36-48	1.01	1.12	2.44	1.04	2.55	2.55	1.46	1.74
48-60	.42	.81	2.61	.84	2.16	1.91	1.53	1.47
NONSALINE LOCATION								
0-3	0.15	0.47	0.33	0.26	0.26	0.16	0.11	0.25
3-6	.11	.15	.42	.28	.23	.16	.13	.21
6-12	.15	.16	.28	.22	.19	.18	.15	.19
12-18	.14	.11	.19	.20	.19	.17	.30	.18
18-24	.17	.12	.17	.21	.13	.18	.20	.17
24-36	.16	.29	.15	.22	.68	.22	.24	.28
36-48	.09	.40	.11	.22	1.32	.75	.54	.49
48-60	.05	.79	1.06	.13	1.78	1.69	.46	.85

TABLE 9.--Water-soluble Mg^{++} for study B soils

SALINE LOCATION

Depth (inches)	Water-soluble Mg^{++} for soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	9.57	5.75	7.93	0.60	4.34	4.26	3.60	5.15
3-6	2.99	3.17	5.98	.50	3.28	4.06	3.70	3.38
6-12	2.74	1.96	2.67	.72	1.18	3.01	2.67	2.14
12-18	2.18	1.85	2.10	.88	1.41	1.43	1.51	1.62
18-24	2.66	1.90	1.66	1.57	.98	.93	.91	1.52
24-36	1.91	1.38	2.21	1.12	1.06	.82	.99	1.36
36-48	1.84	.86	1.87	.97	.95	.73	.97	1.17
48-60	1.09	.92	2.10	.85	1.31	.86	.78	1.13
TRANSITIONAL LOCATION								
0-3	1.33	0.20	0.09	0.01	0.81	0.29	0.57	0.47
3-6	.93	.15	.12	.16	1.60	.77	.82	.65
6-12	1.03	.10	.08	.29	1.47	1.06	.94	.71
12-18	.98	.19	.12	.44	1.31	.94	.95	.70
18-24	1.23	.04	.23	.82	1.18	1.01	.98	.78
24-36	1.33	.86	.81	.69	1.09	1.03	.61	.92
36-48	.88	.89	.89	1.04	.84	1.01	.65	.89
48-60	.40	.71	.97	.41	1.02	.95	1.02	.78
NONSALINE LOCATION								
0-3	0.08	0.12	0.09	0.12	0.14	0.04	0.04	0.09
3-6	.07	.06	.21	.08	.08	.07	.06	.09
6-12	.02	.05	.14	.13	.07	.03	.05	.07
12-18	.12	.23	.05	.06	.02	.13	.48	.16
18-24	.09	.08	.02	.12	.03	.12	.14	.09
24-36	.07	.18	.08	.04	.20	.06	.10	.10
36-48	.08	.37	.01	.10	.24	.18	.04	.15
48-60	.08	.71	.50	.04	.27	.59	.20	.34

TABLE 10. Total water-soluble cations for study B soils

SALINE LOCATION

Depth (inches)	Total water-soluble cations for soil at--							Average of all sites
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	51.69	35.97	49.08	6.35	19.54	17.36	14.46	27.78
3-6	15.81	20.41	33.05	5.43	14.87	16.25	14.18	17.14
6-12	11.27	11.02	17.82	7.32	7.58	12.03	12.54	11.37
12-18	11.27	10.22	12.21	8.56	7.96	7.09	7.32	9.23
18-24	13.67	10.82	11.70	9.79	6.44	5.47	5.51	9.06
24-36	11.43	7.70	13.14	9.45	8.06	5.60	6.48	8.84
36-48	11.60	7.08	11.32	9.12	8.52	6.27	5.86	8.54
48-60	9.06	6.49	12.15	9.37	11.04	5.69	6.53	8.61
TRANSITIONAL LOCATION								
0-3	7.99	0.91	0.94	0.46	3.45	1.36	2.83	2.56
3-6	6.25	.49	1.12	1.41	6.32	3.36	3.73	3.24
6-12	6.37	.43	.76	2.49	6.90	5.19	4.23	3.77
12-18	7.38	.83	.82	4.84	6.99	5.92	4.78	4.51
18-24	8.08	1.58	3.07	7.90	7.05	6.96	6.01	5.81
24-36	8.20	5.86	7.08	8.03	6.79	7.39	4.54	6.84
36-48	6.90	5.89	7.52	7.96	7.01	7.15	5.54	6.81
48-60	4.11	4.82	9.03	6.30	8.25	6.94	7.15	6.66
NONSALINE LOCATION								
0-3	0.34	0.79	0.66	0.56	0.57	0.33	0.26	0.50
3-6	.27	.30	.77	.49	.45	.32	.32	.42
6-12	.26	.32	.57	.45	.38	.29	.31	.37
12-18	.37	2.05	.35	1.02	.31	.36	.93	.77
18-24	.37	3.59	.26	1.31	.22	.37	.54	.95
24-36	.33	1.76	.36	1.98	1.10	.35	.66	.93
36-48	.37	3.74	.41	.60	2.43	1.40	1.64	1.51
48-60	.37	6.24	4.37	.42	4.17	4.19	2.06	1.73

TABLE 11.--Water-soluble Cl^- for study B soils

SALINE LOCATION

Depth (inches)	Water-soluble Cl^- for soil at--							Average of all sites
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	50.46	49.26	35.40	5.05	16.27	15.20	12.43	24.12
3-6	15.10	21.24	34.80	4.61	12.05	13.86	12.10	16.25
6-12	13.16	9.70	16.43	6.16	7.69	10.40	7.36	10.13
12-18	10.44	9.64	11.37	6.54	7.26	6.05	6.18	8.21
18-24	11.16	8.58	10.00	6.66	5.70	4.67	4.53	7.33
24-36	8.07	5.15	12.30	7.59	6.67	4.24	5.02	7.00
36-48	8.05	4.23	9.77	7.04	6.43	2.31	4.77	6.08
48-60	6.50	2.54	11.25	7.59	7.47	3.73	4.77	6.26
TRANSITIONAL LOCATION								
0-3	6.74	0.20	0.43	0.22	2.97	2.09	2.43	2.15
3-6	4.14	.13	.43	.89	5.57	2.95	3.34	2.49
6-12	4.85	.13	.38	1.90	6.36	2.24	3.81	2.81
12-18	4.45	.37	.50	3.48	6.45	5.58	3.31	3.45
18-24	4.52	.77	4.28	5.22	6.27	6.29	5.11	4.64
24-36	3.57	2.54	5.31	7.05	6.02	6.23	3.87	4.94
36-48	1.97	3.57	5.55	2.24	5.89	5.85	4.68	4.25
48-60	.79	3.29	7.07	1.90	6.64	5.45	6.19	4.48
NONSALINE LOCATION								
0-3	0.06	0.15	0.02	0.20	0.11	0.04	0.05	0.09
3-6	.03	.02	.02	.05	.10	.08	.07	.05
6-12	.02	.02	.07	.13	.08	.04	.06	.06
12-18	.07	.07	.12	.03	.06	.02	.10	.07
18-24	.04	.26	.09	.04	.07	.02	.12	.09
24-36	.06	.89	.13	.04	.60	.13	.40	.32
36-48	.06	2.07	.08	.09	1.49	.85	1.32	.85
48-60	.11	3.24	.51	.04	2.84	3.35	1.41	1.64

TABLE 12.--Water-soluble HCO_3^- for study B soils

SALINE LOCATION

Depth (inches)	Water-soluble HCO_3^- for soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	0.06	0.17	0.20	-	0.15	0.15	0.16	0.15
3-6	.10	.18	.23	0.14	.14	.18	.17	.16
6-12	.16	.08	.25	.12	.29	.11	.11	.16
12-18	.09	.10	.21	.09	.40	.05	.12	.15
18-24	.12	.08	.20	.07	.24	.15	.14	.14
24-36	.09	.08	.15	.08	.27	.11	.10	.12
36-48	.08	.08	.15	.08	.31	.10	.06	.12
48-60	.10	.33	.09	.09	.19	.08	.06	.13
TRANSITIONAL LOCATION								
0-3	0.09	0.22	0.20	0.20	0.14	0.11	0.12	0.15
3-6	.21	.28	.19	.14	.19	.15	.14	.18
6-12	.23	.32	.17	.22	.14	.14	.11	.19
12-18	.11	.65	.22	.16	.15	.10	.13	.22
18-24	.09	.28	.15	.19	.11	.10	.10	.14
24-36	.10	.26	.07	.15	.06	.11	.09	.12
36-48	.10	.31	.08	.16	.06	.06	.09	.12
48-60	.10	.21	.17	.12	.06	.04	.07	.11
NONSALINE LOCATION								
0-3	0.24	0.28	0.38	0.32	0.48	0.36	0.27	0.33
3-6	.26	.37	.39	.33	.41	.32	.31	.34
6-12	.30	.32	.40	.32	.39	.36	.22	.33
12-18	.12	.48	.44	.21	.26	.17	.14	.26
18-24	.14	.35	.38	.23	.24	.16	.18	.24
24-36	.10	.33	.28	.23	.25	.11	.13	.20
36-48	.12	.27	.37	.27	.19	.08	.09	.20
48-60	.07	.32	.20	.19	.17	.06	.07	.15

TABLE 13.--Water-soluble $SO_4^{=}$ for study B soils

Depth (inches)	Water-soluble $SO_4^{=}$ for soil at--							Average of all sites
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
SALINE LOCATION								
0-3	1.22	0.74	0.79	0.78	0.94	0.64	1.19	0.90
3-6	1.76	1.58	1.29	.45	.79	.74	.94	1.08
6-12	1.56	1.63	2.37	.11	.34	.84	.85	1.10
12-18	1.70	1.89	1.64	1.04	1.36	.48	.69	1.26
18-24	2.43	1.64	1.32	1.43	1.34	.93	.82	1.42
24-36	3.06	2.67	2.00	2.07	2.19	1.27	.36	1.94
36-48	3.16	2.85	2.16	1.83	2.76	1.60	2.74	2.43
48-60	2.35	3.82	2.29	1.84	4.36	1.84	1.80	2.61
TRANSITIONAL LOCATION								
0-3	1.29	0.00	0.09	0.00	0.06	0.06	0.27	0.25
3-6	1.30	.11	.17	.78	.00	.09	.25	.37
6-12	1.83	.00	.10	.49	.00	.26	.31	.43
12-18	2.63	.00	.12	1.09	.07	.41	.46	.68
18-24	3.50	.00	.62	1.93	.06	.67	.63	1.06
24-36	3.69	2.49	1.92	3.89	.26	1.23	.47	1.99
36-48	4.48	2.12	.19	5.21	.55	1.30	.81	2.09
48-60	3.21	1.54	2.02	3.89	1.49	1.38	.20	1.96
NONSALINE LOCATION								
0-3	0.00	0.27	0.06	0.09	0.40	0.00	0.00	0.12
3-6	.00	.00	.00	.00	.00	.00	.00	.00
6-12	.00	.00	.00	.00	.00	.00	.00	.00
12-18	.00	.00	.37	.00	.35	.00	.58	.18
18-24	.03	.00	.31	.11	.41	.18	.00	.15
24-36	.00	.04	.33	.00	.67	.03	.02	.16
36-48	.00	1.02	.42	.00	1.32	.21	.12	.44
48-60	.00	2.59	2.83	.00	1.92	.00	.40	1.10

TABLE 14.--Total water-soluble anions for study B soils

SALINE LOCATION

Depth (inches)	Total water-soluble anions for soil at--							Average of all sites
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	51.74	50.17	36.39	5.83	17.36	15.99	13.78	27.32
3-6	16.96	23.00	36.32	5.20	12.98	14.78	13.21	17.49
6-12	14.88	10.41	19.05	6.39	8.32	11.35	8.32	11.24
12-18	12.23	11.63	13.22	7.67	9.02	6.58	6.99	9.45
18-24	13.71	10.31	11.52	8.36	7.28	5.75	5.49	8.92
24-36	11.22	7.90	14.45	9.74	9.13	5.62	6.48	9.22
36-48	11.29	7.16	12.08	8.95	9.50	4.01	7.57	8.65
48-60	8.95	6.69	13.63	9.52	12.02	5.65	6.63	9.01
TRANSITIONAL LOCATION								
0-3	8.12	0.42	0.72	0.42	3.17	2.26	2.82	2.56
3-6	5.65	.41	.79	1.81	5.76	3.19	3.73	3.05
6-12	6.91	.45	.65	2.61	6.50	2.64	4.23	3.43
12-18	7.19	1.02	.84	4.73	6.67	6.09	3.90	4.35
18-24	8.11	1.05	5.05	7.34	6.44	7.06	5.84	5.84
24-36	7.36	5.20	7.30	11.09	6.34	7.57	4.43	7.04
36-48	6.55	6.00	6.49	7.61	6.50	7.21	5.58	6.56
48-60	4.10	5.03	9.26	5.91	8.19	6.87	7.46	6.69
NONSALINE LOCATION								
0-3	0.30	0.70	0.46	0.61	0.99	0.40	0.32	0.54
3-6	.29	.39	.41	.38	.51	.40	.38	.39
6-12	.32	.34	.47	.45	.47	.40	.28	.39
12-18	.19	.55	.93	.24	.67	.19	.82	.51
18-24	.21	.61	.78	.38	.72	.36	.30	.48
24-36	.16	1.26	.74	.26	1.52	.27	.55	.68
36-48	.18	3.36	.87	.36	3.00	1.14	1.53	1.49
48-60	.18	6.15	3.54	.23	4.93	3.41	1.88	2.90

TABLE 15.--Exchangeable-sodium percentage (ESP) for study B soils

SALINE LOCATION

Depth (inches)	ESP for soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
0-3	41.3	23.8	24.4	14.1	16.5	-	19.2	28.2
3-6	35.4	19.8	26.1	16.0	13.0	-	22.4	22.1
6-12	41.6	21.8	30.0	15.9	16.0	9.8	19.8	22.1
12-18	29.0	24.9	29.3	17.8	18.9	9.5	17.9	21.0
18-24	27.7	21.8	27.4	20.7	33.3	13.5	12.0	22.3
24-36	24.2	21.8	30.1	25.5	31.8	20.9	25.7	25.7
36-48	31.8	20.6	39.5	29.2	43.0	22.0	24.2	30.0
48-60	19.2	36.7	38.9	30.8	42.3	24.0	27.0	31.3
TRANSITIONAL LOCATION								
0-3	11.0	4.6	5.7	10.7	2.6	4.9	9.3	7.0
3-6	16.9	5.4	5.4	10.1	3.7	5.1	8.9	7.9
6-12	22.2	5.9	7.4	15.9	5.0	6.6	9.1	10.3
12-18	18.6	11.2	8.7	19.3	4.9	8.0	9.9	11.5
18-24	24.5	14.4	10.5	23.4	8.0	10.0	3.7	13.5
24-36	34.7	23.3	19.8	24.8	11.9	14.8	16.7	20.9
36-48	30.5	36.2	21.0	27.1	20.0	20.0	20.0	25.0
48-60	29.0	40.4	27.7	30.3	27.5	22.3	30.1	29.6
NONSALINE LOCATION								
0-3	1.6	2.1	1.7	2.4	1.3	1.5	2.5	1.9
3-6	1.6	2.4	2.0	2.0	1.0	1.0	2.3	1.8
6-12	1.6	1.9	2.7	2.2	2.5	0.9	2.2	2.0
12-18	2.4	-	3.1	-	2.4	2.8	4.6	3.1
18-24	2.5	-	3.6	-	2.8	2.7	5.2	3.4
24-36	3.8	18.9	4.8	4.2	4.4	2.7	6.0	6.4
36-48	4.5	24.6	7.8	5.5	15.7	6.6	15.1	11.4
48-60	10.1	25.8	20.1	16.9	21.3	13.2	19.4	18.1

TABLE 16.--Exchangeable Na^+ for study B soils

Depth (inches)	Exchangeable Na^+ for soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
SALINE LOCATION								
0-3	6.49	4.07	5.09	2.56	2.71	-	3.16	4.01
3-6	4.81	4.39	4.95	3.16	2.28	0.07	3.88	3.36
6-12	9.53	5.41	6.08	3.41	2.92	1.58	3.97	4.70
12-18	9.27	7.67	7.01	4.90	3.90	2.36	4.57	5.67
18-24	8.16	6.95	6.79	6.39	7.80	3.44	2.94	6.07
24-36	7.38	7.05	7.49	7.66	7.44	4.74	5.40	6.74
36-48	9.39	5.90	9.09	8.36	8.95	5.40	5.67	7.54
48-60	5.06	8.67	8.91	9.86	8.33	5.85	7.07	7.68
TRANSITIONAL LOCATION								
0-3	1.93	1.06	1.03	2.03	0.56	0.75	1.22	1.23
3-6	2.83	1.18	1.20	2.00	.81	.82	1.49	1.48
6-12	4.72	1.35	1.42	3.99	1.13	1.26	1.74	2.23
12-18	4.55	2.64	1.90	6.56	1.33	1.68	2.47	3.02
18-24	5.76	3.78	2.63	7.02	1.92	2.17	.80	3.44
24-36	8.95	6.13	4.80	7.48	2.71	3.22	4.01	5.33
36-48	7.69	8.37	4.80	7.30	4.11	4.12	4.53	5.85
48-60	7.28	9.14	6.00	7.42	5.28	4.92	6.33	6.62
NONSALINE LOCATION								
0-3	0.26	0.48	0.36	0.57	0.70	0.26	0.53	0.42
3-6	.26	.55	.39	.43	.70	.16	.46	.42
6-12	.26	.42	.53	.43	.63	.16	.43	.41
12-18	.44	.00	.79	-	.65	.53	.95	.56
18-24	.48	.00	.89	-	.66	.52	1.08	.61
24-36	.92	4.78	1.16	1.00	.84	.56	1.26	1.50
36-48	1.15	5.56	1.94	1.30	2.74	1.37	3.28	2.48
48-60	2.34	6.47	4.55	3.40	3.71	2.58	4.36	3.91

TABLE 17.--Exchangeable K^+ for study B soils

SALINE LOCATION

Depth (inches)	Exchangeable K^+ for soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	1.29	1.18	1.42	1.23	0.82	0.52	0.72	1.03
3-6	.99	.47	1.46	1.17	.43	.71	.81	.86
6-12	1.14	1.35	1.39	1.12	.77	1.10	.92	1.11
12-18	1.13	1.05	1.21	.85	.78	1.13	.90	1.01
18-24	.98	1.11	1.03	.75	.97	1.02	.78	.95
24-36	.89	.83	.84	.79	.99	1.10	.53	.85
36-48	.92	.72	.88	.91	.87	1.99	.48	.97
48-60	.74	.85	.93	1.03	.69	1.87	.56	.95
TRANSITIONAL LOCATION								
0-3	1.32	1.97	1.73	1.46	1.68	1.27	0.70	1.45
3-6	1.54	1.47	1.77	1.25	1.56	1.18	.74	1.36
6-12	1.43	1.18	1.49	1.21	1.30	1.04	.70	1.19
12-18	1.06	.98	1.24	1.14	1.04	.92	.71	1.01
18-24	1.06	.81	1.18	1.29	1.00	.86	.41	.94
24-36	1.22	.76	1.13	1.22	.98	.89	.66	.98
36-48	.97	.74	1.09	1.13	.86	.82	.69	.90
48-60	.82	.73	1.94	1.12	.81	.75	.70	.98
NONSALINE LOCATION								
0-3	1.94	1.92	1.95	2.05	2.39	1.29	1.31	1.84
3-6	1.74	2.06	2.09	1.76	2.09	1.31	1.37	1.77
6-12	1.55	1.60	1.75	1.31	2.00	1.11	1.52	1.55
12-18	1.16	.97	1.36	1.39	1.50	1.30	1.67	1.34
18-24	1.04	.78	.99	1.00	1.39	1.20	1.73	1.16
24-36	.74	.74	.76	.72	1.30	1.05	.92	.89
36-48	.51	.67	.64	.65	1.14	.87	.73	.74
48-60	.66	.81	.72	.66	.90	.84	.62	.74

TABLE 18.--Exchangeable Ca^{++} for study B soils

SALINE LOCATION

Depth (inches)	Exchangeable Ca^{++} for soil at--							Average of all sites
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	8.16	8.91	12.79	10.20	9.31	9.75	9.29	9.67
3-6	9.61	15.13	12.61	10.51	8.94	8.81	10.11	10.82
6-12	10.78	10.33	12.92	11.81	9.29	8.46	9.24	10.40
12-18	14.19	-	14.16	17.01	11.23	11.04	11.99	13.27
18-24	14.15	-	14.04	15.55	11.91	12.58	12.79	13:50
24-36	15.45	14.09	12.56	11.26	10.90	15.21	10.96	12.92
36-48	15.52	11.38	13.39	12.30	10.76	11.67	12.88	12.56
48-60	11.66	16.51	12.38	11.22	13.10	10.67	13.72	12.75
TRANSITIONAL LOCATION								
0-3	9.52	17.88	10.28	9.26	12.72	10.59	8.05	11.18
3-6	10.14	18.61	9.93	10.35	14.22	8.72	9.69	11.67
6-12	11.65	19.39	11.24	11.76	8.50	11.98	10.17	12.10
12-18	12.92	17.69	12.44	15.31	14.74	12.34	12.25	13.96
18-24	13.94	15.84	11.75	15.57	15.11	11.74	12.11	13.72
24-36	12.64	14.78	14.06	14.23	14.90	14.17	12.40	13.88
36-48	11.04	13.94	13.65	14.83	15.23	13.90	15.51	14.01
48-60	10.16	11.74	13.52	11.68	13.53	11.76	15.28	12.52
NONSALINE LOCATION								
0-3	9.44	17.28	11.53	14.39	14.88	9.92	13.01	12.92
3-6	9.05	16.95	12.64	12.43	14.63	9.00	13.59	12.61
6-12	10.45	13.83	11.34	11.89	16.15	10.43	13.34	12.46
12-18	12.22	15.02	10.86	13.24	16.48	11.47	12.63	13.13
18-24	12.44	15.93	15.00	15.47	13.62	12.50	9.99	13.56
24-36	16.61	13.92	15.45	13.68	11.00	11.99	14.68	13.90
36-48	12.90	11.08	12.07	13.34	11.11	16.24	14.66	13.06
48-60	20.80	13.91	12.38	14.40	10.33	10.07	17.31	14.17

TABLE 19.--Exchangeable Mg^{++} for study B soils

SALINE LOCATION

Depth (inches)	Exchangeable Mg^{++} for soil at--							Average of all sites
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	2.90	-	0.98	1.55	3.32	2.79	2.00	2.26
3-6	2.14	4.28	1.76	2.57	4.80	2.78	2.33	2.95
6-12	2.24	3.24	2.74	2.01	-	.61	2.31	2.19
12-18	6.92	8.24	3.11	3.28	3.41	1.85	3.13	4.28
18-24	5.36	7.59	4.63	5.18	5.42	2.57	3.91	4.95
24-36	5.09	.93	4.13	3.76	4.51	3.25	3.23	3.56
36-48	5.75	3.73	6.04	8.62	3.60	5.48	1.11	4.90
48-60	6.04	2.64	4.12	5.62	-	4.72	4.48	4.60
TRANSITIONAL LOCATION								
0-3	3.20	2.92	2.01	3.78	1.98	0.91	1.69	2.36
3-6	-	1.31	2.59	3.59	.43	2.05	1.34	1.88
6-12	4.54	2.00	3.61	4.22	7.21	1.17	3.16	3.70
12-18	4.68	3.37	2.25	4.68	2.80	1.72	2.14	3.09
18-24	5.25	3.94	3.19	5.01	1.27	1.91	3.16	3.39
24-36	5.56	5.20	3.44	6.23	1.07	1.94	2.74	3.74
36-48	4.5°	4.76	4.09	4.76	1.78	2.91	3.58	3.77
48-60	4.37	7.03	4.04	6.23	1.23	3.29	3.30	4.21
NONSALINE LOCATION								
0-3	3.18	2.56	2.36	3.18	3.36	2.84	0.98	2.64
3-6	5.63	2.82	1.63	3.00	5.06	1.15	2.80	3.16
6-12	2.02	9.63	1.29	3.15	.96	2.47	2.81	3.19
12-18	3.18	5.51	-	4.19	2.71	1.44	1.17	3.03
18-24	2.39	4.71	1.42	2.24	1.57	3.40	3.90	2.66
24-36	8.00	5.67	1.97	3.75	1.60	2.89	4.53	4.06
36-48	7.34	3.05	4.25	3.53	4.28	.63	2.98	3.72
48-60	4.67	1.72	3.66	4.12	.91	2.03	3.64	2.96

TABLE 20.--Total exchangeable cations in study B soils

SALINE LOCATION

Depth (inches)	Total exchangeable cations in soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	18.84	-	20.28	15.54	16.16	-	15.17	17.20
3-6	17.55	24.27	20.81	17.41	16.45	12.37	17.13	18.00
6-12	23.69	20.33	23.13	18.35	-	11.75	16.44	18.95
12-18	31.51	-	25.49	26.04	19.32	16.38	20.59	23.22
18-24	28.65	-	26.49	27.87	26.10	19.61	20.42	24.86
24-36	28.81	22.90	25.02	23.47	23.84	24.30	20.12	24.07
36-48	31.58	21.73	29.40	30.17	24.18	23.54	20.14	25.82
48-60	23.50	28.67	26.34	27.73	-	22.11	25.83	25.70
TRANSITIONAL LOCATION								
0-3	15.97	23.83	15.05	16.53	16.94	13.52	11.66	16.21
3-6	-	22.57	15.49	17.19	17.02	12.77	13.26	16.38
6-12	22.34	23.92	17.76	21.18	18.14	15.45	15.77	19.22
12-18	23.21	24.68	17.83	27.69	19.91	16.66	17.57	21.08
18-24	26.01	24.37	18.75	28.89	19.30	16.68	16.48	21.50
24-36	28.37	26.87	23.43	29.16	19.66	20.22	19.81	23.94
36-48	24.22	27.81	23.63	28.02	21.98	21.74	24.31	24.53
48-60	22.63	28.64	24.50	26.40	20.85	20.72	25.61	24.19
NONSALINE LOCATION								
0-3	14.82	22.24	16.20	20.19	21.33	14.31	15.83	17.85
3-6	16.68	22.38	16.75	17.62	22.48	11.62	18.22	17.96
6-12	14.08	25.47	14.91	16.78	19.74	14.17	18.10	17.61
12-18	17.00	21.50	-	-	21.34	14.74	16.42	18.20
18-24	16.35	21.42	18.30	-	17.24	17.62	16.70	17.94
24-36	26.27	25.11	19.34	19.15	14.74	16.49	21.39	20.36
36-48	21.90	20.36	18.90	18.82	19.27	19.11	21.65	20.00
48-60	28.47	22.91	21.31	22.58	15.85	15.52	25.93	21.80

TABLE 21.--Cation-exchange-capacity (CEC) of study B soils

SALINE LOCATION

Depth (inches)	CEC of soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.	Meq. 100 g.
0-3	15.7	17.1	20.9	18.2	16.4	16.1	16.5	17.3
3-6	13.6	22.2	19.0	19.7	17.6	16.1	17.3	18.0
6-12	22.9	24.8	23.4	21.5	18.2	16.1	20.1	21.0
12-18	32.0	30.8	23.9	27.6	20.6	24.9	25.5	26.5
18-24	29.5	31.9	24.8	30.9	23.4	25.5	24.5	27.2
24-36	30.5	32.3	24.9	30.0	23.4	22.7	21.0	26.4
36-48	29.5	28.6	23.0	28.6	20.8	24.5	23.4	25.5
48-60	26.3	23.6	23.5	32.0	19.7	24.4	26.2	25.1
TRANSITIONAL LOCATION								
0-3	17.5	22.9	18.1	18.9	21.3	15.2	13.1	18.1
3-6	16.7	21.8	18.9	19.8	22.1	16.0	16.8	18.9
6-12	21.2	22.7	19.3	25.1	22.5	19.2	19.2	21.3
12-18	24.5	23.6	21.9	34.0	27.0	21.0	24.9	25.6
18-24	23.5	26.3	25.1	30.0	24.0	21.8	21.9	24.9
24-36	25.8	26.3	24.2	30.1	22.7	21.8	24.0	25.0
36-48	25.2	23.1	22.9	26.9	20.6	20.6	22.6	23.1
48-60	25.1	22.6	21.6	24.5	19.2	22.1	21.0	22.3
NONSALINE LOCATION								
0-3	16.2	22.3	21.0	23.2	26.8	17.7	21.4	21.2
3-6	15.8	23.2	19.6	21.0	24.9	16.2	20.2	20.1
6-12	16.6	22.2	19.6	19.8	24.9	16.9	19.3	19.9
12-18	18.3	21.4	25.6	25.2	27.3	19.1	20.8	22.5
18-24	19.5	25.3	24.9	23.6	23.2	19.2	20.6	22.3
24-36	22.0	25.3	24.4	23.6	19.0	20.5	20.9	22.2
36-48	25.4	22.6	24.9	23.6	17.5	20.9	21.7	22.4
48-60	20.7	25.1	22.6	20.1	17.4	19.6	22.5	21.1

TABLE 22.--Percentage of sand in study B soils

Depth (inches)	Sand in soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
SALINE LOCATION								
0-3	59.4	57.0	52.6	59.6	58.6	63.0	64.4	59.2
3-6	60.6	56.0	-	61.6	59.6	62.6	62.6	60.5
6-12	50.0	52.6	46.6	57.6	58.6	63.2	62.2	55.8
12-18	43.0	47.7	41.6	41.6	51.6	56.6	56.2	48.3
18-24	41.6	43.6	38.6	43.6	52.6	53.1	58.8	47.4
24-36	39.6	39.6	32.6	36.6	50.6	51.6	60.6	44.5
36-48	40.2	38.6	31.6	35.6	52.6	48.6	48.6	42.3
48-60	38.6	35.0	29.6	36.6	44.0	44.6	41.6	38.6
TRANSITIONAL LOCATION								
0-3	61.2	50.0	57.6	60.6	56.6	70.0	68.6	60.7
3-6	58.6	50.2	59.6	59.6	55.6	68.8	63.0	59.2
6-12	52.6	48.6	60.6	53.6	56.0	65.2	63.0	57.8
12-18	46.6	46.6	57.6	47.6	54.6	62.0	60.6	53.7
18-24	44.0	40.6	54.6	43.6	52.6	58.6	59.6	50.5
24-36	40.6	36.6	51.6	43.6	52.6	57.6	58.6	48.7
36-48	38.6	37.2	51.6	41.6	47.0	50.2	56.2	46.1
48-60	37.0	34.4	47.6	43.6	40.6	46.6	51.2	43.0
NONSALINE LOCATION								
0-3	63.6	53.2	59.6	54.6	51.0	67.0	60.0	58.4
3-6	63.6	55.2	61.6	56.6	50.6	65.8	60.8	59.1
6-12	63.2	53.2	57.6	61.6	52.6	67.6	62.6	59.8
12-18	62.2	48.6	60.6	62.6	53.0	65.6	63.0	59.4
18-24	60.2	46.6	58.6	60.6	55.2	64.2	63.2	58.4
24-36	58.2	38.6	54.6	61.6	58.2	61.2	61.2	56.2
36-48	52.0	38.6	47.6	60.6	56.6	51.6	54.6	51.7
48-60	50.6	35.6	43.6	58.6	49.6	48.2	50.0	48.0

TABLE 23.--Percentage of silt in study B soils

SALINE LOCATION

Depth (inches)	Silt in soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
0-3	18.8	17.6	20.0	18.0	21.4	15.6	13.6	17.9
3-6	17.4	16.6	-	16.0	18.6	15.0	13.6	16.2
6-12	17.2	17.0	18.0	15.0	19.0	14.4	13.0	16.2
12-18	16.2	14.6	18.0	15.0	18.0	14.0	12.4	15.5
18-24	16.0	14.8	18.0	15.0	16.0	14.2	13.2	15.3
24-36	17.0	15.0	19.0	14.0	16.2	13.0	13.0	15.3
36-48	15.8	15.2	17.0	13.0	17.0	14.0	16.0	15.4
48-60	15.6	16.2	18.0	13.0	20.2	15.0	20.4	16.9

TRANSITIONAL LOCATION

0-3	16.4	21.2	19.0	17.0	20.4	12.0	12.0	16.9
3-6	16.4	18.0	17.0	15.0	19.6	12.6	14.6	16.2
6-12	15.4	16.0	15.0	13.0	18.6	12.4	12.6	14.7
12-18	15.8	15.0	14.0	11.0	18.0	11.8	12.0	13.9
18-24	15.8	16.6	14.0	12.0	18.0	12.0	12.4	14.4
24-36	16.4	16.0	15.0	13.0	18.0	12.0	13.2	14.8
36-48	17.4	15.4	15.0	15.0	19.6	15.4	13.0	15.8
48-60	15.6	16.2	16.0	14.0	21.4	15.2	14.4	16.1

NONSALINE LOCATION

0-3	15.0	19.4	16.0	15.0	20.6	13.0	16.2	16.4
3-6	15.0	16.4	15.0	15.0	20.0	14.2	15.8	15.9
6-12	13.0	14.8	17.0	13.0	21.0	12.0	13.4	14.9
12-18	12.0	15.4	14.0	11.0	19.6	11.4	12.0	13.6
18-24	13.6	14.4	14.0	11.0	17.4	10.8	12.8	13.4
24-36	13.0	15.4	14.0	9.0	16.4	12.4	11.4	13.1
36-48	15.4	14.0	17.0	10.0	17.2	13.0	14.0	14.4
48-60	15.6	15.0	17.0	11.0	19.0	14.4	15.0	15.3

TABLE 24.--Percentage of clay in study B soils

SALINE LOCATION

Depth (inches)	Clay in soil at-- Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Average of all sites
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
0-3	21.8	25.4	27.4	22.4	20.0	21.4	22.0	22.9
3-6	22.8	27.4	-	22.4	21.8	22.4	23.8	23.4
6-12	32.8	30.4	35.4	27.4	22.4	22.4	24.8	27.9
12-18	40.8	38.0	40.4	35.4	30.4	29.4	31.4	35.1
18-24	42.4	41.6	43.4	41.4	31.4	32.4	28.0	37.2
24-36	43.4	45.4	48.4	49.4	33.2	35.4	26.4	42.9
36-48	44.0	46.2	51.4	51.4	30.4	37.4	35.6	42.3
48-60	45.8	48.8	52.4	50.4	35.8	40.4	38.0	44.5

TRANSITIONAL LOCATION

0-3	22.4	28.8	23.4	22.4	23.0	18.0	19.4	22.5
3-6	25.0	31.8	23.4	25.4	24.8	19.4	22.4	24.6
6-12	32.0	35.4	24.4	33.4	25.4	22.4	24.4	28.2
12-18	37.6	38.4	28.4	41.4	27.4	26.2	27.4	32.4
18-24	40.2	42.8	31.4	44.4	29.4	29.4	28.0	35.1
24-36	43.0	47.4	33.4	43.4	29.4	30.4	28.2	36.5
36-48	44.0	47.4	33.4	43.4	33.4	34.4	30.8	39.9
48-60	47.4	49.4	36.4	42.4	38.0	38.2	34.4	40.8

NONSALINE LOCATION

0-3	21.4	27.4	24.4	30.4	28.4	20.0	23.8	25.1
3-6	21.4	28.4	23.4	28.4	29.4	20.0	23.4	24.9
6-12	23.8	32.0	25.4	25.4	26.4	20.4	24.0	25.3
12-18	25.8	36.0	25.4	26.4	27.4	23.0	25.0	27.0
18-24	26.2	39.0	27.4	28.4	27.4	25.0	24.0	28.2
24-36	28.8	46.0	31.4	29.4	25.4	26.4	27.4	30.7
36-48	32.6	47.4	35.4	29.4	26.3	32.4	31.4	33.6
48-60	33.8	49.4	39.4	20.4	31.4	37.4	35.0	32.4

TABLE 25.--EC and ionic composition of water samples from study B sampling locations where water table was reached

Site No. and location	EC[1/]	Na^+	K^+	Ca^{++}	Mg^{++}	Cl^-	$SO_4^=$	HCO_3^-
	Mmhos cm.	Meq. l.	Meq. l.	Meq. l.	Meq. l.	Meq. l.	Meq. l.	Meq. l.
1:								
Saline	35.2	263.0	1.15	60.0	70.0	335.0	78.4	8.0
Transitional	14.2	120.0	1.15	22.0	30.0	46.0	125.6	17.0
Nonsaline	1.65	12.2	.20	6.0	6.0	2.5	.0	20.6
3:								
Saline	48.6	373.0	1.70	82.0	136.0	610.0	70.4	7.0
Transitional	34.1	280.5	1.45	60.0	74.0	400.0	52.4	7.8
Nonsaline	24.3	213.0	1.05	36.0	50.0	217.5	94.4	8.4
5:								
Saline	37.7	387.0	1.45	46.0	84.0	410.0	116.4	6.8
Transitional	34.1	309.8	1.90	56.0	80.0	38.0	88.4	11.2
Nonsaline	25.3	165.8	1.75	80.0	50.0	275.0	46.4	11.4
6:								
Saline	27.9	197.8	.90	48.0	86.0	265.0	120.4	13.0
Transitional	29.0	228.2	1.05	56.0	72.0	275.0	83.4	6.0
Nonsaline	25.8	132.5	.85	84.0	76.0	295.0	50.0	5.6
7:								
Saline	28.4	236.0	.65	70.0	34.0	285.0	78.4	8.2
Transitional	34.1	271.8	2.20	46.0	94.0	365.0	62.0	9.6
Nonsaline	16.0	89.3	.45	32.0	34.0	152.0	34.4	3.6

1/ An EC value greater than 2.0 mmhos/cm. indicates saline water (10).